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EXAMINER	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/083,128	BAVANT ET AL.	
	Examiner	Art Unit	
	SALMAN AHMED	2419	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 December 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,4-7 and 9-24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,4-7 and 9-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *5/30/2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Claims 1, 2, 4-7 and 9-24 are pending.

Claims 3 and 8 have been cancelled by the Applicant.

Claims 1, 2, 4-7 and 9-24 are rejected.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 11 and 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cai et al. (US PAT 6134246, hereinafter Cai) in view of Agarwal et al. (US PAT 6819658, hereinafter Agarwal).

In regards to claim 11, Cai teaches *an apparatus* (Figures 4, 5 and 6, ATM switch 20) *for data transmission between an originating terminal* (Figures 3-6, element 20) *and a terminating terminal* (Figures 3-5, element 50) *in a communications network* (Figures 4, 5 and 6, ATM network) *comprising at least one low-bit-rate artery* (Figures 4 and 5, any one of links 40) *and at least one standard-bit-rate artery* (Figures 4 and 5, links 30 and 60), *comprising a multiplexer device* (Figures 4, 5 and 6, ATM switch 20) *in communication with at least one low-bit-rate artery* (Figures 4 and 5, any one of links 40) *and at least one standard bit-rate artery* (Figures 4 and 5, links 30 and 60), *wherein the switching function of the multiplexer device configured to switch transmitted in basic transmission units according to an adaptation layer protocol among several virtual lines* (column 6 line 59, T1 virtual connections (VCs)) *constituted by connections in multiplexed or non-multiplexed mode* (column 5 lines 46-67, ATM cells are received by the first ATM switch, such as Samsung STARacer ATM switch, over an OC-3 communication link 30. A routing table (RT) 300 then forwards the received ATM cells to a first Segmentation and Re-assembly (SAR) module or chip 310. A first application module 330 associated with the SAR module 310 then assembles the cells into an AAL5 packet and performs a CRC32 check. If the assemble packet is a "good" packet, the SAR module 310 then interrupts an associated central processing unit (CPU) 320 and places the assembled AAL5 packet into a first designated memory location 340. The CPU 320 then adds a sequence number to the placed Protocol Data User (PDU) or AAL5 packet and selects a T1 communication link 40 to communicate the packet. While selecting an outgoing communication link, the CPU selects a T1 link with the

lowest traffic load using a load-balancing algorithm. The PDU or AAL5 packet with the sequence number stored therein is then communicated back down to the SAR module 310. The SAR module 310 de-assembles the user packet into a number of ATM cells and communicates all of the de-assembled ATM cells associated with the particular user packet over the selected T-1 communication link 40), *and wherein the data from the originating terminal transmitted on the at least one standard-bit-rate artery* (Figures 4 and 5, links 30 and 60) *is multiplexed onto the at least one low-bit-rate artery* (Figures 4 and 5, any one of T1 link 40, TITLE: Inverse multiplexing within asynchronous transfer mode communication networks and abstract, Software inverse multiplexing within an Asynchronous Transfer Mode (ATM) communication network is provided by a first ATM switch receiving a stream of ATM cells over a high bandwidth communication link. A Segmentation and Re-assembly (SAR) module associated with the first ATM switch thereafter reassembles the received ATM cells into corresponding user packets. Control data identifying the sequence of assembled user packets are added to each user packet and de-assembled into corresponding ATM cells. The de-assembled ATM cells are then communicated over a plurality of low bandwidth communication links (i.e. multiplexed) to a second ATM switch. Column 2 lines 20-24, The present invention provides a method and apparatus for inverse multiplexing a stream of asynchronous transfer mode (ATM) cells received from a high-bandwidth communication link over a plurality of low-bandwidth communication links), *and an adaptation unit* (figure 4 and 5, element 210) *associated with the terminating terminal, wherein the adaptation unit is configured to*: *extract the packets from the basic transmission units* (column 6 lines 3-

20, In a similar fashion, the receiver 230 associated with the second ATM switch 50 receives the ATM cells communicated over one of the T-1 communication links 40 and forwards them to a second SAR module 360 associated therewith. A second application module 370 associated with the second SAR module 360 then reassembles the received ATM cells into a PDU or AAL5 packet and places it in a designated memory location 380. A CPU 330 associated with the second ATM switch 50 re-sequences the received AAL5 or PDU packet with other packets received over other T-1 communication links and transmits them back down to the second SAR module 360. The second SAR module 360 then de-assembles the AAL5 packets into a number of ATM cells and utilize a routing table 390 to transmit the cells over an outgoing OC-3 communication link 60 in a conventional manner); *and extract the data from the packets* (column 6 lines 3-20, In a similar fashion, the receiver 230 associated with the second ATM switch 50 receives the ATM cells communicated over one of the T-1 communication links 40 and forwards them to a second SAR module 360 associated therewith. A second application module 370 associated with the second SAR module 360 then reassembles the received ATM cells into a PDU or AAL5 packet and places it in a designated memory location 380. A CPU 330 associated with the second ATM switch 50 re-sequences the received AAL5 or PDU packet with other packets received over other T-1 communication links and transmits them back down to the second SAR module 360. The second SAR module 360 then de-assembles the AAL5 packets into a number of ATM cells and utilize a routing table 390 to transmit the cells over an outgoing OC-3 communication link 60 in a conventional manner).

Cai does not explicitly teach multiplexing data from plurality of terminals and compressing data at the originating side and decompressing data at the terminating side.

Agarwal in the same or similar field of endeavor teaches plurality of terminals (figure 4A, T0-T2) being multiplexed (abstract, a method and apparatus for providing for segmentation, reassembly and inverse multiplexing of variable sized packets and ATM cells over satellite and wireless links); and compressing data at the originating side and decompressing data at the terminating side (column 15 lines 24-28, column 16 lines 62-63 and column 18, lines 47-51, Virtual Channels (VCs) can be configured to be enabled for data compression, which means that the Spackets belonging to the VC are to be passed through a data compressor/decompressor combination to save bandwidth. Spackets which belong to a VC which has been specified to be compressed are compressed in data compressor 2400. Next, compressed Spackets are sent to Data Decompression module 2600, which decompresses the Spackets belonging to a VC which has been configured to be compressed. Compression and decompression histories are maintained in the Data compressor 2400 and the decompressor 2600, respectively).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Cai's system/method by incorporating the steps of multiplexing data from plurality of terminals and compressing data at the originating side and decompressing data at the terminating side as suggested by Agarwal. The motivation is that multiplexing enables data from multiple sources be transmitted via

ccmmon lines, instead of dedicating one line for one source; thus conserving resources. Further motivation is that (as suggested by Agarwal, column 15 lines 24-28) Channels can be configured to be enabled for data compression, which means that the packets belonging to a channel are to be passed through a data compressor/decompressor combination to save bandwidth. Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces/market place incentives if the variations are predictable to one of ordinary skill in the art.

In regards to claims 15 and 16 Cai teaches *a network* (Figures 4, 5 and 6, ATM network) *configured to convey data between at least two terminals* (an originating terminal, Figures 3-6, element 20; and a terminating terminal Figures 3-5, element 50), *the network comprising one or more low-bit-rate arteries* (Figures 4 and 5, any one of links 40); *one or more standard-bit-rate arteries* (Figures 4 and 5, links 30 and 60), *a multiplexer device* (Figures 4, 5 and 6, ATM switch 20 with multiplexing functionality) *in communication with the one or more low-bit-rate arteries* (Figures 4 and 5, any one of links 40) *and the one of more standard-bit-rate arteries* (Figures 4 and 5, links 30 and 60) *wherein the multiplexer device is configured to switch packets transmitted in basic transmission units among several virtual lines* (column 6 line 59, T1 virtual connections (VCs)) *constituted by connections in multiplexed or non-multiplexed mode*, *wherein data from an originating terminal transmitted on the one or more standard-bit-rate arteries* (Figures 4 and 5, links 30 and 60) *is multiplexed onto the one or more low-bit-rate arteries* (Figures 4 and 5, any one of T1 link 40, TITLE: Inverse multiplexing within

asynchronous transfer mode communication networks and abstract, Software inverse multiplexing within an Asynchronous Transfer Mode (ATM) communication network is provided by a first ATM switch receiving a stream of ATM cells over a high bandwidth communication link. A Segmentation and Re-assembly (SAR) module associated with the first ATM switch thereafter reassembles the received ATM cells into corresponding user packets. Control data identifying the sequence of assembled user packets are added to each user packet and de-assembled into corresponding ATM cells. The de-assembled ATM cells are then communicated over a plurality of low bandwidth communication links (i.e. multiplexed) to a second ATM switch. Column 2 lines 20-24, The present invention provides a method and apparatus for inverse multiplexing a stream of asynchronous transfer mode (ATM) cells received from a high-bandwidth communication link over a plurality of low-bandwidth communication links) this device being positioned upstream to and downstream from a low-bit-rate artery (column 5 lines 46-67, ATM cells are received by the first ATM switch, such as Samsung STARacer ATM switch, over an OC-3 communication link 30. A routing table (RT) 300 then forwards the received ATM cells to a first Segmentation and Re-assembly (SAR) module or chip 310. A first application module 330 associated with the SAR module 310 then assembles the cells into an AAL5 packet and performs a CRC32 check. If the assemble packet is a "good" packet, the SAR module 310 then interrupts an associated central processing unit (CPU) 320 and places the assembled AAL5 packet into a first designated memory location 340. The CPU 320 then adds a sequence number to the placed Protocol Data User (PDU) or AAL5 packet and selects a T1 communication link

40 to communicate the packet. While selecting an outgoing communication link, the CPU selects a T1 link with the lowest traffic load using a load-balancing algorithm. The PDU or AAL5 packet with the sequence number stored therein is then communicated back down to the SAR module 310. The SAR module 310 de-assembles the user packet into a number of ATM cells and communicates all of the de-assembled ATM cells associated with the particular user packet over the selected T-1 communication link 40); *and a device* (figure 4 and 5, element 210) *associated with a terminating terminal* (figure 3-5, element 50), *wherein the device is configured to extract the packets from the basic transmission units* (column 6 lines 3-20, In a similar fashion, the receiver 230 associated with the second ATM switch 50 receives the ATM cells communicated over one of the T-1 communication links 40 and forwards them to a second SAR module 360 associated therewith. A second application module 370 associated with the second SAR module 360 then reassembles the received ATM cells into a PDU or AAL5 packet and places it in a designated memory location 380. A CPU 330 associated with the second ATM switch 50 re-sequences the received AAL5 or PDU packet with other packets received over other T-1 communication links and transmits them back down to the second SAR module 360. The second SAR module 360 then de-assembles the AAL5 packets into a number of ATM cells and utilize a routing table 390 to transmit the cells over an outgoing OC-3 communication link 60 in a conventional manner), *extract the data from the packets* (column 6 lines 3-20, In a similar fashion, the receiver 230 associated with the second ATM switch 50 receives the ATM cells communicated over one of the T-1 communication links 40 and forwards them to a second SAR module 360

associated therewith. A second application module 370 associated with the second SAR module 360 then reassembles the received ATM cells into a PDU or AAL5 packet and places it in a designated memory location 380. A CPU 330 associated with the second ATM switch 50 re-sequences the received AAL5 or PDU packet with other packets received over other T-1 communication links and transmits them back down to the second SAR module 360. The second SAR module 360 then de-assembles the AAL5 packets into a number of ATM cells and utilize a routing table 390 to transmit the cells over an outgoing OC-3 communication link 60 in a conventional manner).

Cai does not explicitly teach multiplexing data from plurality of terminals and compressing data at the originating side and decompressing data at the terminating side.

Agarwal in the same or similar field of endeavor teaches plurality of terminals (figure 4A, T0-T2) being multiplexed (abstract, a method and apparatus for providing for segmentation, reassembly and inverse multiplexing of variable sized packets and ATM cells over satellite and wireless links); and compressing data at the originating side and decompressing data at the terminating side (column 15 lines 24-28, column 16 lines 62-63 and column 18, lines 47-51, Virtual Channels (VCs) can be configured to be enabled for data compression, which means that the Spackets belonging to the VC are to be passed through a data compressor/decompressor combination to save bandwidth. Spackets which belong to a VC which has been specified to be compressed are compressed in data compressor 2400. Next, compressed Spackets are sent to Data Decompression module 2600, which decompresses the Spackets belonging to a VC

which has been configured to be compressed. Compression and decompression histories are maintained in the Data compressor 2400 and the decompressor 2600, respectively).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Cai's system/method by incorporating the steps of multiplexing data from plurality of terminals and compressing data at the originating side and decompressing data at the terminating side as suggested by Agarwal. The motivation is that multiplexing enables data from multiple sources be transmitted via ccmmon lines, instead of dedicating one line for one source; thus conserving resources. Further motivation is that (as suggested by Agarwal, column 15 lines 24-28) Channels can be configured to be enabled for data compression, which means that the packets belonging to a channel are to be passed through a data compressor/decompressor combination to save bandwidth. Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces/market place incentives if the variations are predictable to one of ordinary skill in the art.

In regards to claim 16, Cai teaches the multiplexer device is incorporated into an ATM switch (Figures 4, 5 and 6, ATM switch 20 with multiplexing functionality).

In regards to claim 17, Cai teaches *network further comprising at least two multiplexer devices* (Figure 3, ATM switches 20 and 50), *wherein, a first multiplexer device is positioned at a first end of a low-bit-rate artery and a second multiplexer device is positioned at a second end of the low-bit-rate artery* (Figure 3, two ends of T-1

communication links), *wherein, the first multiplexer device is configured to extract a plurality of packets from first basic transmission units received from different originating terminals* (column 5 lines 25-29, ATM cells are received by the first ATM switch, such as Samsung STARacer ATM switch, over an OC-3 communication link 30. A routing table (RT) 300 then forwards the received ATM cells to a first Segmentation and Re-assembly (SAR) module or chip 310. A first application module 330 associated with the SAR module 310 then assembles the cells into an AAL5 packet and performs a CRC32 check); and to *multiplex the extracted packets in a second basic transmission unit of a virtual line between tile first end and the second end of the low-bit-rate artery for transmission of the send basic transmission unit from the first end to the second end of the low-bit-rate artery* (column 5 lines 53-56 and columns 5-6 lines 40-2, If the assemble packet is a "good" packet, the SAR module 310 then interrupts an associated central processing unit (CPU) 320 and places the assembled AAL5 packet into a first designated memory location 340. The PDU or AAL5 packet with the sequence number stored therein is then communicated back down to the SAR module 310. The SAR module 310 de-assembles the user packet into a number of ATM cells and communicates all of the de-assembled ATM cells associated with the particular user packet over the selected T-1 communication link 40); *and wherein, the second multiplexer device is configured to: extract the packets from second basic transmission unit* (column 6 lines 7-11, A second application module 370 associated with the second SAR module 360 then reassembles the received ATM cells into a PDU or AAL5 packet and places it in a designated memory location 380); *determine the terminating terminal*

to which each of the packets belong; and insert each of the packet into a third basic transmission unit for transmission to the terminating terminal (column 6 lines 10-20, A CPU 330 associated with the second ATM switch 50 re-sequences the received AAL5 or PDU packet with other packets received over other T-1 communication links and transmits them back down to the second SAR module 360. The second SAR module 360 then de-assembles the AAL5 packets into a number of ATM cells and utilize a routing table 390 to transmit the cells over an outgoing OC-3 communication link 60 in a conventional manner).

Cai does not explicitly teach multiplexing data from plurality of terminals and virtual link.

Agarwal in the same or similar field of endeavor teaches plurality of terminals (figure 4A, T0-T2) being multiplexed (abstract, a method and apparatus for providing for segmentation, reassembly and inverse multiplexing of variable sized packets and ATM cells over satellite and wireless links); and virtual link (column 15 lines 24-28, column 16 lines 62-63 and column 18, lines 47-51, Virtual Channels (VCs) can be configured to be enabled for data compression, which means that the Spackets belonging to the VC are to be passed through a data compressor/decompressor combination to save bandwidth. Spackets which belong to a VC which has been specified to be compressed are compressed in data compressor 2400. Next, compressed Spackets are sent to Data Decompression module 2600, which decompresses the Spackets belonging to a VC which has been configured to be compressed. Compression and decompression

histories are maintained in the Data compressor 2400 and the decompressor 2600, respectively).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Cai's system/method by incorporating the steps of multiplexing data from plurality of terminals and virtual link as suggested by Agarwal. The motivation is that multiplexing enables data from multiple sources be transmitted via ccmmon lines, instead of dedicating one line for one source; thus conserving resources. Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces/market place incentives if the variations are predictable to one of ordinary skill in the art.

4. Claims 20 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cai et al. (US PAT 6134246, hereinafter Cai) and Agarwal as applied to claims 11 and 15 above and further in view of McCormack et al. (US PAT PUB 2006/0133386, hereinafter McCormack).

In regards to claim 20, Cai and Agarwal teach all the limitations of claim 11 above.

Cai and Agarwal do not explicitly teach to determine whether a packet has been lost, and to generate conventional data to replace the lost packet.

McCormack in the same field of endeavor teaches If a packet is lost there is no reason for the receiver to request that the sender resend the packet because the packet

will arrive too late to be useful for real-time transmission. Thus, each packet of real-time traffic is sent using UDP. If a packet is lost, its loss will be detected by the RTP protocol in the receiving application. The receiving application will then be able to take appropriate measures to handle that loss. For example, because, statistically, the preceding packet will be similar to the lost packet, the receiving application can replace the lost packet with its preceding packet (paragraph 0059).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Cai and Agarwal's system/method by incorporating the steps of determining whether a packet has been lost, and to generate conventional data to replace the lost packet as suggested by McCormack. The motivation is that (as suggested by McCormack, paragraph 0059), If a packet is lost there is no reason for the receiver to request that the sender resend the packet because the packet will arrive too late to be useful for real-time transmission and the receiving application can replace the lost packet with its preceding generated packet; thus enabling an efficient communication. Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces/market place incentives if the variations are predictable to one of ordinary skill in the art.

In regards to claim 21, Cai and Agarwal do not explicitly teach to determine whether a packet has been lost, and to generate conventional data to replace the lost packet.

McCormack in the same field of endeavor teaches If a packet is lost there is no reason for the receiver to request that the sender resend the packet because the packet will arrive too late to be useful for real-time transmission. Thus, each packet of real-time traffic is sent using UDP. If a packet is lost, its loss will be detected by the RTP protocol in the receiving application. The receiving application will then be able to take appropriate measures to handle that loss. For example, because, statistically, the preceding packet will be similar to the lost packet, the receiving application can replace the lost packet with its preceding packet (paragraph 0059).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Cai and Agarwal's system/method by incorporating the steps of determining whether a packet has been lost, and to generate conventional data to replace the lost packet as suggested by McCormack. The motivation is that (as suggested by McCormack, paragraph 0059), If a packet is lost there is no reason for the receiver to request that the sender resend the packet because the packet will arrive too late to be useful for real-time transmission and the receiving application can replace the lost packet with its preceding generated packet; thus enabling an efficient communication. Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces/market place incentives if the variations are predictable to one of ordinary skill in the art.

5. Claims 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cai et al. (US PAT 6134246, hereinafter Cai) and Agarwal as applied to claim 11 above and further in view of Beshai et al.(US PAT 6339488, hereinafter Beshai).

In regards to claim 12, Cai teaches a table (Figure 5, RT 300) configured to determine the at leas tone low-bit-rate artery over which the packets in the second basic transmission units are to be transmitted transmitting a basic transmission unit (AAL5) to the multiplexer the multiplexer device is configured to extract the packets from the basic transmission units intended to travel through a low-bit-rate artery and for packetization of the packets in new basic transmission units in multiplexed mode for each virtual low-bit-rate artery and transmit first basic transmission units to the multiplexer device for transmission through the at least one low-bit-rate artery and further configured to transparently switch basic transmission units as described in the rejections of claim 11 above (Figure 5 and columns 5-6, lines 40-20).

Cai and Agrawal do not explicitly teach a shuffler to carry out a transparent switching of the units that do not have to travel through a low-bit-rate artery.

Beshai in the same field of endeavor teaches a shuffler (An optical shuffler or ADM) to carry out a transparent switching of the units that do not have to travel through a low-bit-rate artery (columns 5-6 lines 47-20).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Cai and Agarwal's system/method by incorporating the steps of teach a shuffler to carry out a transparent switching of the units that do not have to travel through a low-bit-rate artery as suggested by Beshai. The motivation is

that (as suggested by Beshai, columns 5-6 lines 47-20) shuffler enables a switch to properly direct traffic to correct destination based on traffic parameters and all the traffic control of the channel is performed by these shufflers, including rate control, QOS (quality-of-service) control, etc. as the established paths are rate-regulated, in establishing reliable individual connections within a path. Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces/market place incentives if the variations are predictable to one of ordinary skill in the art

In regards to claim 13, Cai, Agarwal and Beshai do not explicitly teach using AAL2 protocol.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Cai, Agarwal and Beshai's system/method by incorporating the steps of using AAL2 protocol. The motivation is that, AAL2 protocol is for efficient when transmitting voice related data and it would be obvious to choose a standard protocol, which suits the network requirement, the best. Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces/market place incentives if the variations are predictable to one of ordinary skill in the art.

In regards to claim 14, Cai teaches apparatus is an ATM switch that includes the multiplexer device, and wherein the multiplexer device is configured to switch Common Part Sublayer packets among the several virtual lines constituted by the connections in

multiplexed or non-multiplexed mode, the connections comprising ATM connections in multiplexed or non-multiplexed (Cai: columns 5-6 lines 40-20).

In regards to claim 14 Cai, Agarwal and Beshai do not explicitly teach using AAL2 protocol.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Cai Agarwal and Beshai's system/method by incorporating the steps of using AAL2 protocol. The motivation is that, AAL2 protocol is for efficient when transmitting voice related data and it would be obvious to choose a standard protocol, which suits the network requirement, the best. Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces/market place incentives if the variations are predictable to one of ordinary skill in the art.

6. Claims 1, 5-7, 19 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cai et al. (US PAT 6134246, hereinafter Cai) in view of Morikawa et al. (US PAT 6061354, hereinafter Morikawa), Agarwal2 (US PAT 6963570) and Agarwal et al. (US PAT 6819658, hereinafter Agarwal).

In regards to claim 1, Cai teaches a method for conveying data between at least two users (users connected to links 30 and 60, in figures 4 and 5) having a connection in a communications network (Figures 4, 5 and 6, ATM network) comprising at least one low-bit-rate artery (Figures 4 and 5, any one of links 40) and one or more standard-bit-rate arteries (Figures 4 and 5, links 30 and 60), the data to be transmitted taking the

form of packets (ATM cells), the method comprising: transmitting the packet of application data via the standard-bit-rate artery to a first end of the low-bit-rate artery (column 2 lines 32-36, a stream of ATM cells are received over an incoming high-bandwidth communication link and assembled into associated packets by a segmentation and re-assembly (SAR) module located within the first ATM switch); at the first end of the artery, multiplexing the packet of application data and one or more packets received from originating terminal into a basic transmission unit for transmission to a second end of the low-bit-rate artery and transmitting the basic transmission unit from the first end to the second end of the low-bit-rate artery (column 5 lines 53-56 and column 2 lines 32-44, If the assemble packet is a "good" packet, the SAR module 310 then interrupts an associated central processing unit (CPU) 320 and places the assembled AAL5 packet into a first designated memory location 340. A stream of ATM cells are received over an incoming high-bandwidth communication link and assembled into associated packets by a segmentation and re-assembly (SAR) module located within the first ATM switch. A central processing unit (CPU) associated with the SAR module thereafter adds control data within each packet to identify the position of said packet with respect to the rest of the packets received or to be received by the first switch. The modified packets are then de-assembled by the SAR module into a stream of ATM cells and transmitted over the plurality of low-bandwidth communication links by the transmitter); at the second end of the low-bit-rate artery extracting the packets from basic transmission units (AAL5 packets), and transmitting the packet of application data to terminating terminal (column 6 lines 5-7, the receiver 230 associated with the second

ATM switch 50 receives the ATM cells communicated over one of the T-1 communication links 40 and forwards them to a second SAR module 360 associated therewith) extracting the frames from the packet of application data; and recreate the data (column 6 lines 7-17, a second application module 370 associated with the second SAR module 360 then reassembles the received ATM cells into a PDU or AAL5 packet and places it in a designated memory location 380. A CPU 330 associated with the second ATM switch 50 re-sequences the received AAL5 or PDU packet with other packets received over other T-1 communication links and transmits them back down to the second SAR module 360. The second SAR module 360 then de-assembles the AAL5 packets into a number of ATM cells).

In regards to claim 1, Cai do not explicitly teach packets having a size smaller than the size of the basic transmission unit and multiplexing packets of different originating users.

Morikawa in the same field of endeavor teaches (column 1, lines 19-21 and 37-41) methods for loading a standard ATM cell with multiplexed connections in the form of micro-frames including data shorter than the standard ATM cell. Provide a concrete configuration of a high speed multiplexed transmitter for loading standard ATM cells with a plurality of connections in the form of micro-frames including data shorter than the standard ATM cell.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Cai's system/method by incorporating the steps of packetizing packets having a size smaller than the size of the basic transmission unit

and multiplexing packets of different originating users as suggested by Morikawa. The motivation is that (as suggested by Morikawa, column 14 lines 32-45) the multiplex transmitters can achieve efficient multiplex transmission processing. In addition, it is possible to implement the processing with a minimum delay, and to achieve the multiplexing of micro-frames with different service qualities onto one ATM cell. Moreover, it is possible to improve the channel efficiency and to achieve finer transmission control for maintaining the quality by handling the standard ATM cells and the ATM cells loaded with the micro-frames in the same manner.

In regards to claims 1 and 19, Cai and Morikawa do not explicitly teach converting data into coded frames using a compression algorithm.

Agarwal2 in the same field of endeavor teaches converting data into coded frames using a compression algorithm (columns 6-7 lines 54-11, The present invention specifically concerns an ALA Header Compression Algorithm (ALA-AHCA) that permits 4 octets of a standard 5-octet ATM cell header to be compressed to 2 octets before transmission over a link).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Cai and Morikawa's system/method by incorporating the steps of converting data into coded frames using a compression algorithm as suggested by Agarwal2. The motivation is that (as suggested by Agarwal2, columns 6-7 lines 54-11) data compression can increase bandwidth of a link making the network more bandwidth efficient.

Cai, Morikawa and Agarwal2 do not explicitly teach multiplexing data from plurality of terminals and compressing data at the originating side and decompressing data at the terminating side.

Agarwal in the same or similar field of endeavor teaches plurality of terminals (figure 4A, T0-T2) being multiplexed (abstract, a method and apparatus for providing for segmentation, reassembly and inverse multiplexing of variable sized packets and ATM cells over satellite and wireless links); and compressing data at the originating side and decompressing data at the terminating side (column 15 lines 24-28, column 16 lines 62-63 and column 18, lines 47-51, Virtual Channels (VCs) can be configured to be enabled for data compression, which means that the Spackets belonging to the VC are to be passed through a data compressor/decompressor combination to save bandwidth. Spackets which belong to a VC which has been specified to be compressed are compressed in data compressor 2400. Next, compressed Spackets are sent to Data Decompression module 2600, which decompresses the Spackets belonging to a VC which has been configured to be compressed. Compression and decompression histories are maintained in the Data compressor 2400 and the decompressor 2600, respectively).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Cai, Morikawa and Agarwal2's system/method by incorporating the steps of multiplexing data from plurality of terminals and compressing data at the originating side and decompressing data at the terminating side as suggested by Agarwal. The motivation is that multiplexing enables data from multiple

sources be transmitted via ccmmon lines, instead of dedicating one line for one source; thus conserving resources. Further motivation is that (as suggested by Agarwal, column 15 lines 24-28) Channels can be configured to be enabled for data compression, which means that the packets belonging to a channel are to be passed through a data compressor/decompressor combination to save bandwidth. Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces/market place incentives if the variations are predictable to one of ordinary skill in the art.

In regards to claim 5, Cai teaches the Common Part Sublayer packet (AAL5) is formed of the Application data packet and a header (Cai: columns 5-6 lines 40-20).

Cai, Morikawa and Agarwal2 do not explicitly teach the packet of application data is formed of a fixed number of successive coded frames.

Agarwal in the same field of endeavor teaches the packet of application data is formed of a fixed number of successive coded frames (Agarwal: columns 6-7 lines 54-11).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Cai, Morikawa and Agarwal2's system/method by incorporating the steps of using application data being formed of a fixed number of successive coded frames as suggested by Agarwal. The motivation is that fixed number of successive coded frames requires less complex processing steps as opposed to variable number of successive coded frames; thus streamlining the data packet processing procedure.

In regards to claim 6, Cai, Morikawa, Agarwal2 and Agarwal teach receiving data to be converted into coded frames according to protocol as described in the rejection of claim 1 above.

In regards to claim 6, Cai, Morikawa, Agarwal2 and Agarwal do not explicitly teach using AAL1 protocol.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Cai, Morikawa, Agarwal2 and Agarwal's system/method by incorporating the steps of using AAL1 protocol. The motivation is that, AAL1 protocol is for efficient when transmitting fixed data and it would be obvious to choose a standard protocol, which suits the network requirement, the best.

In regards to claim 7 Cai teach when the second end of the low-bit-rate artery (Figures 4 and 5, any one of links 40) corresponds to a first end of an additional low-bit-rate artery (Figures 4 and 5, any one of other links 40), repeating the multiplexing of the packet of application data and one or more packets received from a originating terminal into a basic transmission unit for transmission from the first end to a second end of the additional low-bit-rate artery (Cai: columns 5-6 lines 40-20).

Cai does not explicitly teach multiplexing data from plurality of terminals.

Agarwal in the same or similar field of endeavor teaches plurality of terminals (figure 4A, T0-T2) being multiplexed (abstract, a method and apparatus for providing for segmentation, reassembly and inverse multiplexing of variable sized packets and ATM cells over satellite and wireless links).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Cai's system/method by incorporating the steps of multiplexing data from plurality of terminals as suggested by Agarwal. The motivation is that multiplexing enables data from multiple sources be transmitted via ccmmon lines, instead of dedicating one line for one source; thus conserving resources. Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces/market place incentives if the variations are predictable to one of ordinary skill in the art.

In regards to claim 24, Cai teaches transmitting the basic transmission unit from the first end to the second end of the low-bit-rate artery automatically occurs at the end of an adjustable time lag which is set when a first packet of application data is inserted into the basic transmission unit (column 9, Table 1, T_Ses_Init_Timer).

7. Claims 20 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cai, Morikawa, Agarwal2 and Agarwal as applied to claim 1 above and further in view of McCormack et al. (US PAT PUB 2006/0133386, hereinafter McCormack).

In regards to claim 18, Cai, Morikawa, Agarwal2 and Agarwal teach all the limitations of claim 1 above.

Cai, Morikawa, Agarwal2 and Agarwal do not explicitly teach to determine whether a packet has been lost, and to generate conventional data to replace the lost packet.

McCormack in the same field of endeavor teaches If a packet is lost there is no reason for the receiver to request that the sender resend the packet because the packet will arrive too late to be useful for real-time transmission. Thus, each packet of real-time traffic is sent using UDP. If a packet is lost, its loss will be detected by the RTP protocol in the receiving application. The receiving application will then be able to take appropriate measures to handle that loss. For example, because, statistically, the preceding packet will be similar to the lost packet, the receiving application can replace the lost packet with its preceding packet (paragraph 0059).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Cai, Morikawa, Agarwal2 and Agarwal's system/method by incorporating the steps of determining whether a packet has been lost, and to generate conventional data to replace the lost packet as suggested by McCormack. The motivation is that (as suggested by McCormack, paragraph 0059), If a packet is lost there is no reason for the receiver to request that the sender resend the packet because the packet will arrive too late to be useful for real-time transmission and the receiving application can replace the lost packet with its preceding generated packet; thus enabling an efficient communication. Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces/market place incentives if the variations are predictable to one of ordinary skill in the art.

8. Claims 22 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cai et al. (US PAT 6134246, hereinafter Cai) in view of Agarwal2 (US PAT 6963570) and Agarwal et al. (US PAT 6819658, hereinafter Agarwal).

In regards to claims 22 and 23, Cai teaches apparatus (Figures 4, 5 and 6, ATM switch 20 and 50) for data transmission in a communications network, comprising: a first adaptation unit (Figure 5, elements 310 and 320) associated with an originating terminal, wherein the first adaptation unit is configured to receive, from the originating terminal, data according to a first protocol (column 5 lines 25-29, ATM cells received over an incoming high bandwidth communication link 30, such as a OC-3), convert the received data into coded frames (AAL5 packet), form a packet of application data comprising a plurality of the coded frames according to a second protocol (AAL5 packet), and insert the packet into a first basic transmission unit at a rate of one packet per unit for transmission to a first end of a low-bit-rate artery (column 2 lines 32-36, a stream of ATM cells are received over an incoming high-bandwidth communication link and assembled into associated packets by a segmentation and re-assembly (SAR) module located within the first ATM switch); a first multiplexer device (Figure 5 element 220) associated with the first end of the low-bit-rate artery, wherein the multiplexer device is configured to extract the packet from the first basic transmission unit and from first basic transmission units received from originating terminals, and to multiplex the extracted packets into a second basic transmission unit for transmission to a second end of the low-bit-rate artery (column 5 lines 53-56 and column 2 lines 32-44, If the assemble packet is a "good" packet, the SAR module 310 then interrupts an associated

central processing unit (CPU) 320 and places the assembled AAL5 packet into a first designated memory location 340. A stream of ATM cells are received over an incoming high-bandwidth communication link and assembled into associated packets by a segmentation and re-assembly (SAR) module located within the first ATM switch. A central processing unit (CPU) associated with the SAR module thereafter adds control data within each packet to identify the position of said packet with respect to the rest of the packets received or to be received by the first switch. The modified packets are then de-assembled by the SAR module into a stream of ATM cells and transmitted over the plurality of low-bandwidth communication links by the transmitter); a second multiplexer device (figure 5 element 230) associated with the second end of the low-bit-rate artery (Figures 4 and 5, any one of links 40), wherein the multiplexer device is configured to extract the packets from the second basic transmission unit (column 6 lines 5-7, the receiver 230 associated with the second ATM switch 50 receives the ATM cells communicated over one of the T-1 communication links 40 and forwards them to a second SAR module 360 associated therewith), determine the terminating terminal to which each of the packets belong, and insert each of the packets into a third basic transmission unit for transmission to the terminating terminal; and a second adaptation unit associated with the terminating terminal, wherein the second adaptation unit is configured to extract the packets from the third basic transmission unit, extract the coded frames from the packets, and to recreate the data from the originating terminal (column 6 lines 7-17, a second application module 370 associated with the second SAR module 360 then reassembles the received ATM cells into a PDU or AAL5 packet and

places it in a designated memory location 380. A CPU 330 associated with the second ATM switch 50 re-sequences the received AAL5 or PDU packet with other packets received over other T-1 communication links and transmits them back down to the second SAR module 360. The second SAR module 360 then de-assembles the AAL5 packets into a number of ATM cells and The second SAR module 360 then de-assembles the AAL5 packets into a number of ATM cells and utilize a routing table 390 to transmit the cells over an outgoing OC-3 communication link 60 in a conventional manner).

In regards to claims 22 and 23, Cai and Morikawa do not explicitly teach converting data into coded frames using a compression algorithm.

Agarwal2 in the same field of endeavor teaches converting data into coded frames using a compression algorithm (columns 6-7 lines 54-11, The present invention specifically concerns an ALA Header Compression Algorithm (ALA-AHCA) that permits 4 octets of a standard 5-octet ATM cell header to be compressed to 2 octets before transmission over a link).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Cai’s system/method by incorporating the steps of converting data into coded frames using a compression algorithm as suggested by Agarwal2. The motivation is that (as suggested by Agarwal2, columns 6-7 lines 54-11) data compression can increase bandwidth of a link making the network more bandwidth efficient.

Cai and Agarwal2 do not explicitly teach multiplexing data from plurality of terminals and compressing data at the originating side and decompressing data at the terminating side.

Agarwal in the same or similar field of endeavor teaches plurality of terminals (figure 4A, T0-T2) being multiplexed (abstract, a method and apparatus for providing for segmentation, reassembly and inverse multiplexing of variable sized packets and ATM cells over satellite and wireless links); and compressing data at the originating side and decompressing data at the terminating side (column 15 lines 24-28, column 16 lines 62-63 and column 18, lines 47-51, Virtual Channels (VCs) can be configured to be enabled for data compression, which means that the Spackets belonging to the VC are to be passed through a data compressor/decompressor combination to save bandwidth. Spackets which belong to a VC which has been specified to be compressed are compressed in data compressor 2400. Next, compressed Spackets are sent to Data Decompression module 2600, which decompresses the Spackets belonging to a VC which has been configured to be compressed. Compression and decompression histories are maintained in the Data compressor 2400 and the decompressor 2600, respectively).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Cai and Agarwal2's system/method by incorporating the steps of multiplexing data from plurality of terminals and compressing data at the originating side and decompressing data at the terminating side as suggested by Agarwal. The motivation is that multiplexing enables data from multiple sources be

transmitted via ccmmon lines, instead of dedicating one line for one source; thus conserving resources. Further motivation is that (as suggested by Agarwal, column 15 lines 24-28) Channels can be configured to be enabled for data compression, which means that the packets belonging to a channel are to be passed through a data compressor/decompressor combination to save bandwidth. Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces/market place incentives if the variations are predictable to one of ordinary skill in the art.

9. Claims 2, 4 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cai et al. (US PAT 6134246, hereinafter Cai) in view of Morikawa et al. (US PAT 6061354, hereinafter Morikawa), Agarwal2 (US PAT 6963570) and Agarwal et al. (US PAT 6819658, hereinafter Agarwal) as applied to claim 1 above and further in view of Kim (US PAT 6594266).

In regards to claim 2, Cai teaches multiplexing of data in AAL packets from the originating user to the low-bit-rate artery and demultiplexing AAL packets from the low-bit-rate artery as described in the rejections of claim 1 above.

Cai, Morikawa, Agarwal2 and Agarwal do not explicitly teach the AAL packet that is payload to ATM cell is Common Part Sublayer PDU (CPS-PDU).

Kim in the same field of endeavor teaches the AAL packet that is payload to ATM cell is Common Part Sublayer PDU (CPS-PDU) (See figure 1).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Cai, Morikawa, Agarwal2 and Agarwal's system/method by incorporating the teachings of AAL packet that is payload to ATM cell is Common Part Sublayer PDU (CPS-PDU). The motivation is that (as suggested by Kim, columns 1-2, lines 60-2), such format is based on recommendation I.363.2 and I.363.5 of Telecommunication Standardization Sector of ITU (ITU-T) provided in International Telecommunication Union and it is advantageous to adapt to known standards for implementation of ATM-AAL based communication for following reason: Companies actively involved in adhering to standards more frequently reap short- and long-term cost-savings and competitive benefits than those that do not. Standardization can lead to lower transaction costs in the economy as a whole, as well as to savings for individual businesses. Standards have a positive effect on the buying power of companies. Standards can help businesses avoid dependence on a single supplier because the availability of standards opens up the market. The result is a broader choice for businesses and increased competition among suppliers. Companies also have increased confidence in the quality and reliability of suppliers who use standards. In addition, standards are used by businesses to exert market pressure on companies further down the value chain, i.e., their clients. Thus, businesses can use standards to broaden their potential markets.

In regards to claim 4, Cai, Morikawa, Agarwal2 and Agarwal do not explicitly teach using AAL2 protocol.

Kim in the same field of endeavor teaches using AAL2 protocol.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Cai, Morikawa, Agarwal2 and Agarwal's system/method by incorporating the steps of using AAL2 protocol as suggested by Kim. The motivation is that, AAL2 protocol is for efficient when transmitting voice related data and it would be obvious to choose a standard protocol, which suits the network requirement, the best.

In regards to claim 10, Cai teaches transporting digital voice (column 1 line 48).

10. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cai et al. (US PAT 6134246, hereinafter Cai) in view of Morikawa et al. (US PAT 6061354, hereinafter Morikawa), Agarwal2 (US PAT 6963570) and Agarwal et al. (US PAT 6819658, hereinafter Agarwal) as applied to claim 1 above and further in view of Stacey et al. (US PAT 6590909, hereinafter Stacey).

Cai, Morikawa, Agarwal2 and Agarwal teach multiplexing technique as described in the rejections of claim 1 above.

Cai, Morikawa, Agarwal2 and Agarwal do not teach header of the packet of the application data to provide error checking when sent between terminals in communication network.

Stacey in the same field of endeavor teaches error checking using UUI in the header of application data communicated between terminal in communication network (See fig 6).

It would have been obvious to one of ordinary skill in the art at the time of the invention to have provided Cai, Morikawa, Agarwal2 and Agarwal's system/method with

error checking via the use of UUI in light of the teachings of Stacey in order to provide for a secure channel.

Response to Arguments

11. Applicant's arguments see pages 11-14 of the Remarks section, filed 12/3/2008, with respect to the rejections of the claims have been fully considered but are moot in view of new ground of rejection presented in this office action.

Conclusion

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to SALMAN AHMED whose telephone number is (571)272-8307. The examiner can normally be reached on 9:00 am - 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edan Orgad can be reached on (571) 272-7884. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Salman Ahmed/

Examiner, Art Unit 2419